A Dravidian decipherment of Indus script

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Abstract

The Indus script writing system is described here as a logo-syllabic system with almost unique syllables associated with them. The crucial aspect of the decipherment is the observation that semantic value of numbers are not related to quantifiers but are used as adjectives such first/strong/mature etc., through the syllables that are derived out of it. The standalone semantic values of the logo have crucial role to play in deciding the syllabic value of the logo, but it only uses the modified syllabic value in the instances of the text. Although main syllabic value is maintained around it's primary consonant value, the syllables have pluripotency both in terms of semantics and syllables in context, i.e., they have modified vowels and soft consonants (glides). This decipherment is not only about syllabary, it also provides complete semantic decipherment as well, uncovering various aspects of the life of Indus Valley Civilization. Most of the seals are about the barter trade transactions and describe from/to addresses, with mode-of-transport indicated in-between. The urn-symbol is deciphered as "ūr" (town/village) with various adjectives preceding it (or infused into the sign) describing the town. The unicorn-seal indicates that it is trade-related activity. The fish-signs and arrow signs describe the mode of transport of goods. The goods are indicated by the object before the animal indicating wether it is a food-type or not (perishable goods or not). The decipherment also uncovers aspects other than trade, like marriage and disputes.

Prelims

We list a few acronyms/initialisms that is commonly used in the article:

IVC : Indus Valley Civilization
DED: Dravidian Etymology Dictionary [1]
M77: MASI 77, Mahadevan [2]
WB: Wells, B., Indus Writing [3]
MVB: M.V.Bhaskar [4]

DED refers to the entry numbers in Dravidian Etymology Dictionary [1]. Here we use M77 to denote Mahadevan's sign numbers [2], but the glyphs in this paper were created using Asko Parbola's NFM Indus Script font. Mahadevan has simplified and reduced the number of signs, by considering many of them as variants of the same theme or treating them as identical. For a richer source of symbols and data, please refer to Wells [3] or the character list in NFM Indus Script font.

Introduction

Indus valley civilization was contemporary to other civilizations such as the Mesopotomia and Egyptian civilizations with it's own independent system of writing. Each of these systems had their own culture and languages that were unique to their own civilization. It is a great challenge to

decipher any one of them without a multilingual Rosetta stone, but such decipherments have been successfully achieved in the case of Linear Elamite [5]. In the case of Indus script it has been well established, through various indirect attempts, that it is closely related in cultural aspects with the ancient Dravidian culture and language. However, broad confusion arises when attempts are made to relate it to an alphabetic system as it seems similar to a complex logo-syllabic system like the Egyptian system of writing. There have been many futile attempts to conjure-up such a relation between the Tamil Brahmi writing system and the Indus script, despite of the fact that the Indus signs have strong pictorial content.

It took a while for the modern alphabets to arrive (around 1000 BCE) and one can expect that the logo-syllabic system of Indus script, like the earlier versions of Egyptian writing system, to be pre-alphabetic/abugida stage, where pure consonants have not yet been crystalized and extracted out of the spoken languages. From this decipherment it seems that the atomic units (signs) of the IVC writing system are logo-syllables, with the high potential for creating homophones, thus reducing the number of signs required for the orchestration of the writing system within the specific context of IVC society and it's trade transactions.

In this decipherment, the author followed the trail left by these signs (like a detective), as it uncovers through internal evidences tracing them one by one. Sometimes serendipity plays a big role in our findings, and all this would not have been possible but for the enormous sign lists and concordance data that has been gathered painstakingly by many reserachers over very many decades, making them freely accessible online. Of course, it also helps if your mother tongue has roots to the very same language and culture, although displaced in time by more than 5000 years!

In the next section we first outline the syllabary of Indus scipt as it is preceived here. Detailed list of all symbols and their syllabic values are described in a later section on "Syllabic development". After the next section on orthography we briefly describe the skilled artistry of Indus writing system, then the crucial role of Numbers, Clitics and the system of "Learning through pun". In the section after "Syllabic development" we describe a few frequent phrases that emerge out of the corpus with two or three logos. We then classify a few logos under functional ideographic categories (although they are primarily syllables they also have certain ideographic tendencies). Next we outline the crucial aspects of fish signs and their various manifestations. In the section after this we briefly sketch the dominant trade activities and their relative importance and it's implications in the development of a class society. We then go on to decipher several lines of text in the corpus and also seals containing interesting graphical content with their corresponding text in a "Show and tell" section. We end the body of the article with sections about "Overlap with previous work" and "Acknowledgements".

Orthography of the Indus script

The logo-syllabic syllabary of Indus will be described here as it is preceived here in use. We try to discern if there are broad rules of orthography in this writing system that we can observe. We will start with some simple number systems and see how they can prefix or suffix to other symbols/syllables in the system.

To begin with we use a simple rule that there is one and only one syllable to which each of these signs get assigned to. This is a simple rule to follow and it can be easily be discerned if it breaks. We will now describe the other patterns or rules that we observe.

Let us now consider the M77 sign-373 ○ to which we assign the syllable "pa" (from "pakal", meaning the sun or daylight). For the sign-86 | we assume that it has the value "mutal" (the primary one) and then see how it applies to the sign-375 ⊙. We believe that this value is indicated by the sign-376 ⊙ that has a tooth attached to it. So we have:

pa + mut-al = pal

Now let us consider the sign-391 ⊛, a sign that we know has strong correlations with elephant seals from MVB [4] findings, so we assign the value "palla" that also has close proximity to "pal", but we can see there are three cross-lines and/or six small pieces, making it more like "pillir". There is also another possibility that this is decided by DED 1045 ōṭai/ōṭa, a metal badge that is applied to the forehead of the elephant. So we observe that although broad rules are applied, there are also *ideosyncracies* of local culture that also provide a few interesting twists and turns, but in general it tries to confirm to some broad outlines.

We will now move to the interesting sign-287), which we have assigned the value "valai/vaḷai" after looking at it's close cousins sign-298))))) and sign-290) that has five strokes affixed to it's top-right.

))))) =) = vala + ||||| = valai

Doubling on that we get,

))))) = valai + ||||| = valai + ai = valaianjih or valaicci or valayacci

If sign-290 has three strokes on top we can get,

) = valai + ||| = vaḷai + mu = vaḷaiyam

Semantically vala/vaḷa is "right", "curved" as the symbol right parenthesis and when combined with "5" it becomes valai.

We also observed for M77 sign-62 ⟨) that we can assign value "vālai" (scabbard fish that has sharp teeth). The sign-295)) "iru-valai" sounds similar to "ēri-vāḷai". These signs also indicate that such deformation of the base syllable is possible, i.e., "valai" ≈ "vālai" and "ēri" ≈ "iru". Of course, high homophony is one of the crucial principles in creating a script with minimal number of signs.

Next, we look at sign-81 ⟨) that we assign the value "valai-puri", while we assign sign-63 ⟨)) the value "kanni-pori" (DED 1183, 4538). This then decides "kanni" for fish-sign and "puri" ≈ "pori" for bird (quail) sign.

Based on these successes we decide to take a look on the other variants of fish-sign. For sign-70) we apply "kāl" (DED 1483 assigns the semantic value of "cart") and for sign-72) "kōl" (DED 2238 assigns a semantic value of "raft/float"). One might ask why not assign the values the other way around, but the important clue comes from the cross-line that looks more like paddle/oar. Yes, again there are some *ideosyncracies* that comes with it.

We now move to sign-328 ⋃ for which we asign the value "ū/u/va". So for the sign-332:

) = ⋃ + |||| = va + ai = vai

Similarly we also get the very important sign-342:

𖩠 = 𖩇 + 𖩈 = ū + iru = ūr

Next, we get on to double affix, sign-336 𖩋:

𖩋 = 𖩇+𖩉+𖩍 = u + mu-ta-l + n̲ = uṭan̲ (DED 945)

Here sign-374 𖩍 takes the value "n̲" (from droplet, "nīr") and sign-336 𖩋 (uṭan̲) has the ideographic association with mortar & pestle (a marriage ritual association as well)! In the M77 concordance list the sign-321 𖩀 is immediately preceded by sign-336 𖩋. As the two sign-374 𖩍 are joined together by a string, a value of "ñāṇ" (DED 2908 "string") will be the correct one:

𖩀𖩋 = uṭan̲ + ñāṇ = uṭan̲-ñāṇ (marriage agreement)

Although the picture speaks thousand words there are also hints of syllables through micro-typography in Indus script. Consider sign-402:

𖩁 = 𖩍 + 𖩉 = na + ṭu = naṭu

𖩂 = 𖩊 + 𖩁 = nāl + naṭu = nāṭu

𖩃 = 𖩉 + 𖩍 = mutal + ni = maṇi

𖩃 = 𖩍 + 𖩉 = ni + mutal = aṇiyal

and now let us consider another sign-51:

𖩄 = 𖩊 + 𖩈 + 𖩅 = mu + iru + an = māran

with an additional twist as "māran" twists and looks back (a feature observed by Mahadevan and passed-on through personal communications by MVB).

Of course, we can also say as additional double-emphasis things like:

mu-kula-iru-vaṟi-māran

(triple generation true path Maran)

Now on to another topic:

M77 No.	Glyph	Roman	Tamil
169	𖩆	nilam	நிலம்
171	𖩌	nilai	நிலை
174	𖩎	iru-nēla	இருநெல்
88	𖩏	nal-iru	நல்-இரு

These are characters that seems to stand-out (pun intended with "nil" being DED 3675 "to stand"), i.e., decided more by the context of IVC barter transactions and not by any complex orthography rules.

So as a broad outline we can say that the signs in IVC script are strongly associated with unique syllables and that the IVC writing system allows plenty of ways to mutate them in many ways from

their base ideographic glyph values. However, it is not clear that in the case when there are multiple affixes applied, then which comes first, i.e., whether a base glyph applies first etc. In general one could assume it flows from right-to-left and top-to-bottom, but I suppose there are many exceptions that are decided by the context.

For example the famous sign-116 𒉿 can take the value "nellai/nallai" but the other-way around can also be "ayal" is quite unlikely in the IVC transaction context. Sign-112 𒉾 works as "munnāl" but in the semantics of IVC transactions "ñālam" works better. Of course, both are possible and even within the context of IVC "munnāl" might be a better choice in some particular case.

The non-affixed pure IVC signs have unique syllables associated with them, which have either single consonant and two consonants at the most. The combining rules usually seem to drop the middle consonants, and of course the vowels are modified as pertinent to the situation.

In some cases the components may not be a disjoint merger but a continuous merger (welding) of the two as in this case:

𓄿 = 𓄰 + 𓂝

taṟi = tan-vaṟi

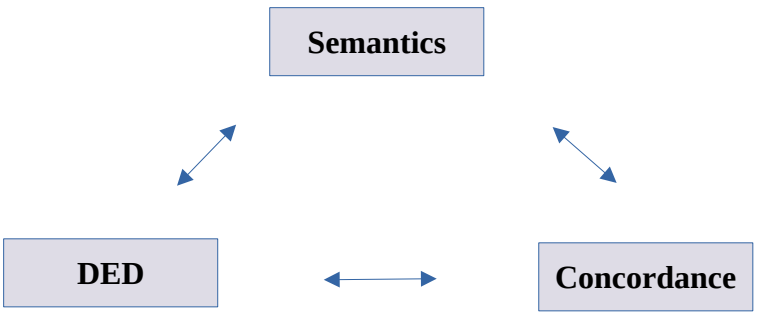
Finally as an interesting remark I would like to bring to attention a nice little sign-310 𓃾 with a probable value of "vilavila" (DED 5424) that sounds similar to "vavvāl" (long-tailed fruit bat?) as used in this line of text:



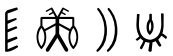
Trembling with fear "vilavila" congnates well with "eerie bat", so we try to decipher this line. Vilamban trembling with fear "loading" (māṭṭu, 𓌙) the bow, but what's to the right of vilamban, a tiger? Tiger trembling or the hunter trembling? So we notice that it could be:

ciṟuttai = cīpu + iru-tai = 𓄿 + 𓂧 (right-to-left) = 𓄿

This describes the process of discovery through an example. As a broader generalization we could insist for Dravidian decipherment that the following triangle commute (i.e., more like walking on three legs or squash on three walls):



We illustrate this with a line of text:



valan.ai-iru.valai-varvan.ur-anjih

To fit it into the context we need to modify this to:

valamai-iru.vilai-vuṟavan.ur-anjih
வளமை இருவிளை உழவனூர் வஞ்சி

Semantics:
Fertile highly productive farmer’s town paddy
or
Fertile double-crop farmer’s town paddy

We now show how consonants and vowels express themselves in this system, but since it is not an alphabetic system, they don’t carry any special importance by themselves as there are many more syllables with single and double consonants that are used to complete the langauge.

Consonants and their signs

Consonant	M77 sign	Glyph	Roman	Tamil
ka (க)	59		kaṇṇi	*கன்னி*
ce (சே)	76		cēval	*சேவல்*
ta (த)	216		tanṭi	*தண்டி*
pa (ப)	373		pakal	*பகல்*
pu (பு)	78		pūr	*பூர்*
pū (பூ)	54		pū	*பூ*
ma (ம)	242		māṭi, māṭu	*மாடி, மாடு*
mē (மே)	197		mēl	*மேல்*
mu (மு)	86		mu	*மு, முதல்*
mū (மூ)	89		mū	*மூ, மூணு*
na (ன)	374		na	*ன*
nā (நா)	95		nāl	*நால்*
r (ர)	87		ranṭu	*ரண்டு*
va (வ)	328		va	*வ*
ṟa (ழ)	400		ṟa	*நுழ*
ṟu (ழு)	110		ṟu	*ழு*

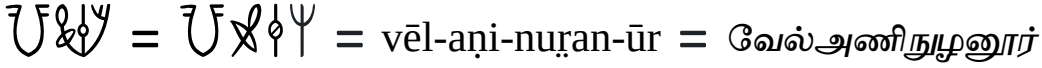
Although vowels and glides can be arbitrarily mutated, modified or introduced in to the system while combining with the base syllable, the vowels are very much required at the beginning of a word. We list a few here.

Vowels and their signs

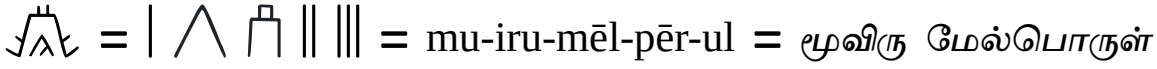
Vowel	M77 sign	Glyph	Roman	Tamil
an (அ)	1		an	-அன்
āṭu (ஆ)	50		āṭu	ஆத்து ஆடு
ila (இ)	323		ila	இல
ūr (ஊ)	342		ūr	ஊர்
eṛu (ஏ)	110		eṛu	ஏழு

Skilled artistry of Indus script

At the core of Indus script lies the mastery of a skilled metallurgist (). We will illustrate this with these with few examples:



The semantic meaning being the town with tailors, jewellery and hunting professions.



In this case the semantic meaning could be the mighty great guardian of the township (elevated to kings and gods at later times).

Some important townships

This is just indicative of the various kinds of townships and professions, and a deeper quantitaive study is required to obtain their relative importance. What is interesting is that the last one in the list is farmer's town, which doesn't count really as a town, but in Dravidian languages, the term "ūr" seems to cover what we call "village" also. Here we use M77 to denote Mahadevan's sign numbers [2], but the glyphs in this paper were created using Asko Parbola's NFM Indus Script font. DED refers to the entry numbers in Dravidian Etymology Dictionary [1]. For a richer source of symbols and data, please refer to Wells [3]. Some of these signs here have been identified earlier by other authors, so a proper acknowledgment of these facts will be added later on in a separate section.

M77 Sign	Glyph	Syllable	DED	Description	Tamil
342		ūr	752	town	ஊர்
347		velūr	-	hunter's town	வேலூர்
358		chevūr	-	bronze worker town	செவ்வூர்
351		vel-nuṛan-ūr	-	hunter-cloth worker town	வேல்நுழவூர்
?		che-palla-ūr	-	bronze-elephant worker town	செவப்பல்லூர்
355		vel-palla-ūr	-	hunter-elephant worker town	வேல்பல்லூர்

M77 Sign	Glyph	Syllable	DED	Description	Tamil
361		che-ko-ūr	-	herder-bronze worker town	செங்கோவூர்
372		vel-aṇi-nuṛan-ūr	-	hunter-jeweller-tailor town	வேல்அணிநுழனூர்
15		uṛavūr	688	working, farming town	உழவூர்

Numbers

Numbers are treated separately, but they are just like other glyphs, easily welded and affixed to other glyphs, producing a plethora of possibilities. However, they are an important pointer to the fact that the actual standlone semantic value (in this case the numeric number) of the glyphs may have very little to do with it's semantic value.

M77 Sign	Glyph	Syllable	DED	Description	Tamil
86		mutal, -al	4950	one, primary	முதல், -ல்
87		-ar, -ir, iru-	474, 481	two, great, eminence	ரண்டு, -இர், -ர், இரு-
89		mū-, mūn-	5052	three	மூ-, மூன்-
95		nal-, -nāl, nalla-	2912	four, good	நல்-, -நால், நல்ல-
96		-ai	2826	five, unity	-ஐ
108		aru-, -ar	2485	six, river, fort	ஆறு, அறு
110		eṛu-, -eṛu	910	seven, rise, fertile	ஏழு, -எழு
	Application of above phonemes				
112		nalam, ñālam, munnāl	2913	land, healthy, before	நலம், நாலம், முன்னால்
116		nallai, nellai	-	rice	நல்லை, நெல்லை
121		nal.nel.āl	-	good rice person	நல்நெல்லாள்
120		mu-munamum	-	three generations back	மும்முன்னோனும், மும்முன்னமும்
119		mu-munnor	-	two generations back	மும்முன்னோர்
107		mūri, mūrā	5041	bullock, buffalo	மூரி, மூரா

Clitics

Clitics provide sentence structure (the subject and the object). The default reading order is right to left, but before the clitic  (sign 99), the reading is supposed to be left to right (but this doesn't seem to be followed strictly by writers of IVC script).

M77 No.	Glyph	Syllable	Tamil
97		-il, -da, -ta, -in	-ட, -டு, -த, -து, -இல், -இன்
99		-ra, -ru	-ர, -ரு, -ற, -று
123		-yar, -yin	-யர், -யார்
344		ūr-ār	ஊரார்
343		ūr-il	ஊரில்

The Indus writing is not without it's own inaccuracies, either by themselves or captured by mistake by the scribes. We noticed a few cases where the clitic sign-99 has been captured as sign-87 , which in those particular instances seem more like a case of sign-99 rather than sign-87. However, it must be mentioned that there are very few mistakes in the Mahadevan's corpus (both in intent and purpose), which has done a nice balancing act between variety and simplicity, thus making it easier for decipherment. For a slightly different opinion from Mahadevan on the list of signs is Wells [3]. We follow Mahadevan's sign list and numbers here, but it must be possible to do it using Wells [3] list of signs and sign-number as well without any loss of generality.

Learn through pun

Following are an indication of the pun that abounds in Indus script, which is termed as the "rebus principle". Of course, it only makes sense if your language is close to ancient Dravidian. For deeper understanding you may have to refer to some of the sign values below this in the section on "Syllabic development". We only sketch a few, but the Indus script syllabary abounds in such pun. The reduction of number of glyphs required for a writing system for Dravidian language is very much dependent on prudently choosing glyphs that provide highest possible homophony.

M77 Sign	Glyph	Syllable	DED	Description	Tamil
298		valai = vala+ai	5267, 5288	) = vala+5	வல+ஐ=வலை
	Right-parenthesis is "vala" (curved as well as right) in Tamil and "vala" + "ai" = "valai". "vala" is curve, as well as "right", which fits well with description of right parenthesis. Also, can be further expanded as "valaicci" or "valayacci" or "valayanjih".				
62		valai-kanni	5379	scabbard fish with fang-like teeth	வாளை கன்னி (மீன்)
	The fish "vālai" is known as the scabbard fish that has sharp teeth. A nice tooth is drawn at the top to elucidate the learning. This explains that the right-parenthesis sign-287 carry the phonetic value "valai"				
295		eri-valai	902	Another sharp tooth fish	ஏரி வாளை (மீன்)
	A fresh water shark, Wallago attu, also known "eri-valai", a pun again on the word with rebus equation: "vālai" ≈ "valai". The prefix "eri" comes from "two" or "iru", leading to one more rebus equation: "iru" ≈ "eri".				
63		kanni-pori-valai	-	Trapping of birds	கன்னி-பொறி-வலை

M77 Sign	Glyph	Syllable	DED	Description	Tamil
	This learning tablet defines the phonetic value of fish as “kanni” and the bird as “puri” by defining it through a polysyllabic pun as “kanni-pori” with a parenthetic “valai” . The “kanni-pori” in Tamil is “trapping”.				
64		valai-kanni	-	The clitic reverses reading order	கன்னி-பொறி-வலை
	The clitic sign 64 reverses the reading order to the right of it. This learning script defines that.				
376		pal	-	teeth	பல்லு
	A teeth is indicated by the protruding teeth effect, just like in the fish teeth.				
57		irumpu	486	iron	இரும்பு
	Now we have triple pun: iru-pu (two insects) ≈ erumpu (ant) ≈ irumpu (iron)				
181		kottu	2065, 2064	pour (sting)	கொட்டு
	We can see pincler claws are indicated to show “sting” and “pour” are homophones in Dravidian “kottu”. The stinging honey-bee also is supposed elucidate connotations of “honey” that pours (kottu) from the beehive.				
393		palla-ar	3986a, 1045, 4016	palla, pallar	பல்லர் (பள்ளம்)
	The sign 391 “palla” (see sign list below) is indicated here by putting it upside down in a hole (pallam) by creating the pun.				
310		vila-vila	5424	tremble with fear	விலவில
	This cognates with “vavvāl” (DED 5370), probably a long-tailed fruit bat, with an eerie shivering scene that it creates.				
303		iṭa,	432	cleft, gap, split, crack open , slit, breach, chasm	இட
	Also works as “iṭaveḷi” ≈ “iṭai-valai”.				

Signs and affixes

240 Just to give a flavor of the decipherment here we group few signs under base/affix geometry. In some cases there could be more than one affix. For more details see next section “Syllabic development”.

Sign ○

Affix / Base	׀	׀׀	׀׀׀	׀׀׀׀	׀׀׀׀׀	׀	׀	׀	׀ ׀	׀	׀׀׀׀ - ׀׀
○											
pa	pal	para	pammu	nal-para	pallā	vel-appa	pān	cir̲appu	pānal	pān-an	nal-pallar
பா	பல்	பற	பம்மு	நல்பற	பல்லா	வெல-ப்பா	பாண்	சிறப்பு	பானல்	பானன்	நல்பல்லர்

Sign ∪

Affix / Base	׀	׀׀	׀׀׀	׀׀׀׀	׀ ׀	׀ ׀ ׀׀׀׀	׀׀	- ׀׀	׀׀׀
∪									
ū	vaḷ	ūr	ūm	vai	uṭan̲	uṭai	velūr	chevūr	vel-aṇi-nuṟan-ūr
ஊ	வள்	ஊர்	உம்	வை	உடன்	உடை	வேலூர்	செவ்வூர்	வேலணிநுழனூர்

Sign ⋈

Affix / Base	׀	׀	׀׀׀׀	׀׀	׀	׀׀׀ ׀׀׀	׀	-	׀
⋈									
ta	taḷ	tan	tai	irutai	cir̲uttai	mumutai	tāṟi	taṭa	tan
த	தள்	தன்	தை	இருதை	சிறுத்தை	மும்முதை	தாழி	தடா	தன்

Sign ⍲

Affix / Base	׀	׀	׀׀׀	׀׀׀	׀׀	׀׀׀׀
⍲						
kanni	kāl	kōl	peru-kanni	peru-kaṉai	kōnda, gōnde	kalam
கன்னி	கால்	கோல்	பெருங்கன்னி	பெருங்கணை	கொண்ட, கோண்டே	கலம்

250 **Sign** 

Affix / Base			-		-			-
								
an	āḷ	aṇṇaṉ	kāvalan	naṭṭan	uṟavan	kīṟrān	mutalvan	nal-mutalvan
அன்	ஆள்	அண்ணன்	காவலன்	நாட்டான்	உழவன்	கீழன்	முதல்வன்	நல்முதல்வன்

Sign 

Affix / Base							
							
kō	kōṭṭa, kōṭu	kōṭai	kōṭṭam	nāl-vaṟi-kōṭai	nērciṟa-kō	pallar-kōṭṭa	kōṭai-vaṟi
கோ	கோட்ட, கோட்டு	கோட்டை	கோட்டம்	நல்வழி-கோட்டை	நேர்சிற-கோ	பல்லர் கோட்டை	கோட்டை வழி

Sign 

Affix / Base	180°		180°	- 180°	90°	270°	
							
valai	iṭai	valaiyan	iṭaiyan	iṭa	kuṭa, kuṭai	ū	iru-valai
வலை	இடை	வலையன்	இடையன்	இட	குடை	ஊ	இருவிளை

Sign

Affix / Base									
-n	nāṭu	aṇiyal, maṇi	nuḷḷāṉ, nuṟan	ñāṇ	nan	nannu, nannan	nalnelāḷ	nan-mutal	nāṅkuṟu
ன்	நாடு	அணியல், மணி	நுளாண், நுழன், நுழம்பு	நாண்	-னன்	நன்னு, நன்னன்	நல்நெல்லாள்	நன்முதல்	நன்குழு

Syllabic development

255 We outline from top to bottom how the syllabary is slowly developed from simple to complex glyphs. Happy journey!

M77 Sign	Glyph	Syllable	DED	Description	Tamil
1		an	131, 132	person	அன்
		an(n)-an	131, 132	brother	அண்ணன்
2		kāvalan	1417, 1416	security guard	காவலன்
25		mutalvan	4950	chief	முதல்வன்
26		nal-mutalvan	-	good chief	நல்முதல்வன்
3		āḷ	399	servant, slave, soldier, messenger	ஆள்
4		natt-an	3638	country man	நாட்டான்
5		natt-ar-an	3638	country rules	நாட்டாரன்
6		kompaṉ	2115	clever man	கொம்பன்
7		val(i)-an	5276	skilled man	வலியன்
162		vēḷ, vēl	5545, 5536	chief, spear, trident	வேல்
8		vēlan, vēṭan	5545, 5368, 5527	chief, lance fighter, hunter	வேலன், வேடன்
9		valai-vēlan, valaiyan	5288	animal trapper	வலையன்
12		uṟavan	688	farmer	உழவன்
13		uṟavāḷ	688	farm worker	உழவாள்
14		per-uṟavan	688	big farmer	பேர் உழவன்
15		uṟavūr	688	working, farming town	உழவூர்
35		valaiyan	5288	Trapper, fisherman	வலையன்
41		kīṟān	1621	poor	கீழான்
42		pallan	3986a	mahout	பல்ல(வ)ன்
54		pu	4345	flower, insect, flourish, bloom, create	பூ (பூச்சி)
55		pol	4550	flowering, flourishing, blooming, creating	பொலி, பொலிவு
374		-n	1159b, 3621, 3621a	night, bug	நீர் (துளி), (ப)னி, நள், நல்லு

M77 Sign	Glyph	Syllable	DED	Description	Tamil
410		ñāṇ, nān	2908, 3639	string, me	நாண், நான்
415		nānnan	2908, 3639	twiner	நாணன்
417		nalnelāḷ	-	Good farmer	நல்நெல்லாள்
412		nāṅkuṟu	2906	earthworm	நாண்குழு
186		kūṟu, kuru	1924, 1921, 1782	section/ division/share, to proclaim, brilliant	கூறு
299		ida, idai	449	hip, left	இட-, இடை
301		idayan	450	herder, herdsman	இடையன்
287		vala-, vaḷai	5313, 5314, 5288	bent, trap, right, net	வல, வள, வலை, வளை
298		valaicci, valaiyacci	5288	surround, trap, hunter	வளைச்சி, வலையச்சி
293		valaiyan	5288	animal trapper (short form)	வலை வேலன், வலையன்
303		iṭa, iṭavai	432, 434	narrow way	இட, இடவை
186		kutai	1714	notch at end of bow	குதை
312		kuṭa, kuṭai	1660	hollow, cavity, penetrate	குடை
328		vu	651, 761	ooze, mortar	வ, உ, உள
?		vala, vala	5304	strong, fertile	வல-, வள-
32		uvan		person between two	உவன்
330		ūm (ūmaṉ)	748	to fly (owl)	ஊம் (ஊமன்)
332		vai	5549-53	to stay, straw of paddy, to abuse, sharp	வை
336		uṭaṉ, valaṉ	945	with, consent, immediately	உடன், வலண்
337		uṭai	593	wealthy	உடை
342		ūr (ural, uṟi)	752 (651, 708)	town, village	ஊர் (உரல், உறி)
347		vēlūr	-	hunter's town	வேலூர்
358		cevūr	-	bronze worker's town	செவ்வூர்
344		ūr-ar	-	important sign with clitics	ஊரார்
343		ūr-il	-	important sign with clitics	ஊரில்
373		pa	3805, 4016, 4124, 3884	sun, pot	பகல், பள்ளம், பானை, பண்

M77 Sign	Glyph	Syllable	DED	Description	Tamil
375		pal, pala	3986a	teeth, many	பல், பல
386		poli, poḷi	4550, 4560	prosperous, chisel	பொலி, பொளி
379		pammu	3934	to baste, to yarn	பம்மல்
391		pallā	3986a, 1045	elephant	பல்லா (யானை)
	Depicted by the ornamental oval-shaped plate that is fixed on it’s forehead				
392		nal-pallar (nalla-palla-iru)	-	good mahout	நல் பல்லர்
403		paṟai, parru	4031, 4032, 4034	announcement (sale) with a drum beat	பறை, பற்று
407		pulam	4303	arable land	புலம்
406		paḷapaḷa	4012	glittering, well-oiled	பளப்பள
404		nal-paṟai		good announcement	நல்ல பறை
387		vēlappa		worker, hunter	வேலப்பன்
389		pañ-nilam	3837	ploughed land	பண்ணிலம்
254		paṭi, paṭṭi	3848, 3850, 3868	hamlet, village, settlement, rest, roost, step gradee, rank	படி, பட்டி
216		tan, tān	2946, 3188, 3110	earthen pot	தன், தண் (தண்டி), தவளை
217		toḍar, todu, toṭu	3480, 3482	touch, begin, join, to wear, dress-up	தொடு
53		tāvu	3177	jump, luxuriant, tread gently	தாவு, தவளை
222		tal, tol	3123, 3105, 3516	obstruct, stop beat, crush, old, ancient	தள், தொள்
223		mumuta	-	grand-parent	மும்மூத
229		taṛ, tāṛi	3178	bow down	தாழு, தாழி
36		tan	3045	cold, water	தண் (தண்ணீர்)
?		pān	4068	song, melody	பாண்
396		pāṉal	4071	rice-field	பாணல்
31		pāṇan	4068	tamil bard	பாணன், பாடுபவன்
59		kaṇ, kanni	1159a, 1166, 1168, 1417, 1483	bamboo raft, trap, trapper	கண், கன்னி
60		nalla-kanni	-	good vehicle, good trapper	நல்ல கன்னி
67		kondu, kōnda, gōnde	2053, 2216	bull, with	கொடு (கொண்டு),

M77 Sign	Glyph	Syllable	DED	Description	Tamil
					கோண்டே, கொண்டே, கொண் ட
72		kōl	2238	boat, raft	கோல்
70		kāl	1483	cart	கால்
65		peru-kanni		big boat, big cart	பெருங்கன்னி
75		peru-kaṉai	1404	intense, abundance	பெருங்கனாய்
69		kaṉṉal	1305, 1415	vessel, ship	கண்ணல்
66		nal-peru-kanni	-	great good gentleman	நல்பெருங்கன்னி
66		nal-peru-kanni	-	great good gentleman	நல்பெருங்கன்னி
58		muttu	4959, 4932, 4957	pearl, excellent, praiseworthy	முத்து
78		paṟa, puṟā, puṟa, pūṛ, pori	4020, 4334, 4374, 4603	pigeon, dove, quail, chicken	புறா, புற, பூழ், பொரி
77		paraṇ-	4020	birds	பரண்- (பறந்தூர்)
80		parapurai	3949	to spread (message through pigeon?)	பறப்புறை
81		valai-pori	-	trapping bird	வலைபொரி
319		mura	4977	snail, curl	முற, முறை, முறுக்கு
134		peru, pēr	4411	big, large	பெரு, பேர்-
204		perum	-	large	பெரும்
209		peru-mutal	-	large primary	பெருமுதல்
210		perum-mutal	-	large primary	பெரும்முதல்
206		mu-perum		mature large primary	முப்பெரும்
205		nāl-kompu, nāmpu	2115, 3649	good clever, sprout of millet	நால்கொம்பு, நாம்பு
261		kō	2177, 2178	mountain, gentry	கோ, கோட்டை
	Origin of the word “kō” could be the Gond people (gōnde, DED 2216) of the mountains, reinforced by the West wind, from western practice of having kings in Sumeria				
30		kōvan		herder, herdsman, gentry	கோவன்
	Cattle class that eventually becomes the ruling gentry				
267		kōṭṭa, kōṭu	2207, 2053, 2203, 2200	gift, munificence, fort, gentry (west wind,	கொட, கோட்ட, கொடு, கொம்பன்

M77 Sign	Glyph	Syllable	DED	Description	Tamil
				western practice of having kings in Sumeria), horn	
272		kōṭai, kōṭai	2207, 2049	fort, gift	கோட்டை
271		kōṭṭam	2058	cattle-shed	கோட்டம்
244		aṟu, ārṟu, aṟai, araṇ	317, 407, 322, 201	strong, dwellment, camp, room, castle	அறு, ஆறு, அறை, அரண்
242		māṭi, māṭu	4796a, 4798	mansion, terrace, ox	மாடி, மாடு
197		mē, mēṭu, mettai	5086, 5058, 5069	top, terrace	மேல், மெத்தை
198		mē-mu	5086	higher excellence	மேமு
199		mē-vēl	5086	excellent hunter	மேவேல்
200		nal-mē	5086	good excellence	நல்மே
402		nāṭu	3638	country (as a contrast to forest)	நாடு
245		taṭṭi, taṭṭu	3036, 3039	cloth, wooden frame, hammer, tap	தட்டி, தட்டு
296		vaṟi	5297	way	வழி
149		nālvaṟi	5297	cross-road	நால்வழி
297		aruvaṟi	5297	six-way crossing	அறுவழி, ஆறுவழி
135		peruvaṟi	5297	big way	பெருவழி
136		aim perumvaṟi	5297	five big way	ஐம் பெருவழி
153		poruḷ, poṟal, poṟil	4544, 4555, 4558	object/goods, town, earth/country/district	பொருள், பொறல், பொறில்
155		ampi	177	boat, raft, ship	அம்பி
211		anuppu (ampu)	329 (178)	send	அனுப்பு, அன்பு
83		iṟappan, iṟappu	501	death	இறப்பு
50		āṭu	5152	goat	ஆத்து, ஆடு
124		ēr	2815	plough	ஏர்
125		eṟu	863	full, strong	எறு
126		inai	457	join, unite, mingle	இணை

M77 Sign	Glyph	Syllable	DED	Description	Tamil
161		vilaku	5423	diverge	விலகு
47		aṟan	204	squink, law-abiding, just	அறண், அரணை
48		nal-aṟan, aṟan-nal-	-	good behavior	நல் அறன், அறநல்-
113		viḷai-ñālam	5437, 2913	fertile land	விளை நாலம்
415		mu-pala	7-	important many	முப்பல
171		nil-(v)anji, nilai	-	stable	நில்வஞ்சி, நிலை
?		nal-inai, nāl-inai	-	good joining, joining four	நல்லிணை, நாலிணை
49		kula	1829	generation, geneology	குலம்
51		māṟu, māṟan, mu-kula-iru-māṟan	4834	reliable third generation barter (showing one’s back)	மாறு, மாறன், முக்குல மும்மாறனார்
302		māṟṟal	4834	exchange	மாற்றல்
137		cēr, cēri	2814, 207	join, union, assemblage, hamlet	சேர், சேரி
140		nal-iru-cēri	-	good, strong assemblage	நல்லிருச்சேரி
141		cēri-vaṟi	-	road to assemblage	சேரிவழி
142		cēri-vaṟi-anjih		road to assemblage resting place	சேரிவழிவஞ்சி
129		koḷ	2151	seize, acquire	கொள்
130		koḷal	2151	exchange, buy/sell	கொள்ளல், கொள்முதல்
148		cērukoḷ	5297, 2151	exchange, buy/sell	சேர்ந்துகொள்
237		mutal	4951	base, foot, stump	முதல்
304		vil, viḷ	5422, 5421, 5432, 5433	bow, call out, sell	வில்
305		viḷai	5437	productive, mature	விளை
127		alaku, alanku, aṟagu	239, 240, 246, 255	beak, beauty, grains of paddy	அலகு, அழகு
306		aṟaku-ɨilam	-	good home	அழகு ஈஇல்லம்
307		viḷampu	5433, 5434	proclaim openly, serve food	விளம்பு
17		villavaṉ	5422	archer	வில்லவன்

M77 Sign	Glyph	Syllable	DED	Description	Tamil
28		viḷampan	5434	one who superintends the distribution	விளம்பன்
310		vila-vila	5424	tremble with fear	விலவில
397		aṇi, aṇiyal, maṇi-	116, 4672	jewel, pearl necklace	அணி, அணியல், மணி, முத்து மாலை
398		peru-aṇi(yal)	116	big pearl necklace	பெரு அணி
377		nal-aṇi-pala	-	many good pearl necklaces	நல் அணி பல
233		mumalai	-	three mountain range	மும்மலை
235		mumalai-vel	-	three mountain hunter	மும்மலை வேல்
180		koṭṭu, koṭṭam	2063, 2064, 2066	pour, sting	கொட்டு (தேன்), கொட்டம்
181		koṭṭu	2063, 2064	pour, sting	கொட்டு
169		nilam	3676	land, ricefield	நிலம்
171		nilai	3675	firm, stable	நிலை
173		irunilai	3675	very firm, stable	இருநிலை
174		iru-nilam	481, 3676	great/vast land	இருநிலம்
88		nal-iru	3610, 480	fine life	நல்லிரு
176		vanjī, anjih, añcal	5265, 56, 54	paddy, rice, to take on shoulder, resting place	வஞ்சி, அஞ்சி, அஞ்சல்
166		vēl-vanjī	-	hunter’s lair	வேல்வஞ்சி
249		māṭṭu	4801, 4802	fasten, put in, fasten, hook, kindle, fire	மாட்டு
253		māṭṭal	4802	necklace	மாட்டல்
252		mārram (māṭṭu + mu)	4834	exchange, barter	மாற்றம்
182		mūtai (mū + iṭai)	4954	long under cultivation, mature	மூதை
178		kalappai, kalam	1304	plough, vessel, ship	கலப்பை, கலம்
323		il, ila	494, 497	non-existence, leaf	இல
325		ila	497	leaf	இல
326		ilai, iḷai	497, 496, 513	leaf, young	இலை, இலஞ்சி
327		iḷavaṟian, iḷaivaṟian	-	horticulturalist?	இலைவழியான்
76		cē, cēval	1931, 2818	red, bronze,	சே, செம்மை, சேவல்

M77 Sign	Glyph	Syllable	DED	Description	Tamil
				cock	
311		yāṟ, eṛil	5156	harp, music, beauty	யாழ், எழில், இசை
400		nuṟan	3714, 3715	penetrate, stitch	நுழ-, நுழன், நுழம்பு, நுளம்பு
219		tai (ta + kaccai)	3473	sew, stitch	தை
214		irutai	481, 3473	strong stitch, good tailor	இருதை
?		cī, cīpu, cil, calli	2599, 2622, 1577, 2382	cleanse, wooden peg, splinter	சீ, சிப்பு, சில்
240		cil	1577	small	சில்
241		ciṟa	2589	eminent, illustrious	சிற-
381		ciṟappu	2589	eminent, illustrious	சிறப்பு
256		nērciṟa	3772	just and eminent	நேர்சிற
266		nērciṟa-kō	2177	just and eminent leader	நேர்சிற கோ
215		ciṟuttai	2590	panther	சிறுத்தை
258		cīrmai	2624	excellence, greateness	சீர்மை
257		cutti, cuttiyal	2668	small hammer	சுத்தி, சுத்தியல்
259		cutti, cuttiyal	2668	small hammer	சுத்தி, சுத்தியல்
192		paḷḷi	4018	hamlet, herdsman's village	பள்ளி
193		perum-puli	4307, 4411	big tiger	பெரும்புலி
321		ñāṇ	2908	marriage string, necklace	நாண்
322		nēññil	2907	plogh-shaft	நென்னில்
367		nānan	2908	yarn maker	நாணன்
82		taṟupu	3142, 3169	to join together, amass (wealth)	தறுப்பு (தாரா - வாத்து)
202		mā-	4786	up	மா-
247		caṭṭam	2304	frame, mould	சட்டம்
341		uṟu	689	harrow	உழு (பரப்பு, பரம்பு)

M77 Sign	Glyph	Syllable	DED	Description	Tamil
177		nal-mutal, nalāl	-	good chief, good worker, hard worker	நல்முதல்-, நல்லாள்
409		nan-nil	3588	Good standing	நன்னில்
365		viri	5411	spread, expand, blossom	விரி
190		pāḷaiyam	4117	army camp, village surrounded by hillocks	பாளயம்
189		toṭṭi, tōṭṭi	3485, 3547	fence, rake	தொட்டி, தோட்டி
191		toṭṭil	3486	cradle	தொட்டில்
202		mēṭṭu, mēḍu, metta	5058, 5069	height, eminence, hillock, upper storey, storied house	மேட்டு, மேடு, மெத்த
203		peru-mēṭṭu, peru-mēḍu, peru-metta	5058, 5069	height, eminence, hillock, upper storey, storied house	பெருமேட்டு, பெருமேடு, பெருமெத்த
188		mett-eṉal	5070	gentleness	பெத்தெனல்
366		utaḷ	610	goat	உதல்

Common phrases

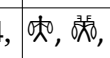
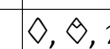
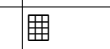
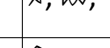
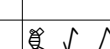
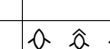
Here we list multiple logos (mostly pairs and triplets) that commonly occur together in IVC. We also list a few non-aglutinative entangled glyphs which we try to describe them as complex mixed states.

M77 Signs	Glyph	Syllable	DED	Description	Tamil
321-336		uṭaṉ-ñāṇ	2908	marriage	உடன் நாண் (உடன்தை)
	Sign-336  also has ideographic mortar & pestle marriage association as well				
176-321-336		uṭaṉ-ñāṇ-anjih	2908	marriage hall	உடன் நாண் அஞ்சி
148	 = + 	maṟukoḷal, cērkoḷal	5297, 2151	barter, exchange, buy/sell	மாறுகொளல், சேர்ந்துகொளல்
12-124		ēr-vuṟavan	-	farmer	ஏர் உழவன்
169-124		ēr-nilam	-	farm land	ஏர் நிலம்
113		viḷai-nallam	5437-	cultivable rich	விளை நல்லம்

M77 Signs	Glyph	Syllable	DED	Description	Tamil
			3613	soil	
130-51		maṟu-koḷal, mu-kula-iru-māran-koḷal	-	barter	மாற்று கொள்
402-267		koṭa-nāṭu	-	herder country	கொட நாடு
402-267		valaiyan-nāṭu	-	trapper’s country	வலையன் நாடு
402-76		cē-nāṭu	-	red country, bronze country	சே நாடு
67-65		peru-kanni-kondu	-	with big vehicle	பெருங்கன்னி கொண்டு
59-67		konda-kal	-	bullock cart	கொண்டா கல், கோண்ட கல், மாட்டு வண்டி
59-67		peru-konda-kal	-	big bullock cart	பெரு கோண்ட கல், பெரு மாட்டு வண்டி
307-379-176		pammu-vilambu-anji	-	bow stringer’s resting place	பம்மு வில்லம்பு அஞ்சி
402-379-319		mura-pammu-nadu	-	yarn twisting country	முறபம்மு நாடு
342-379-398		perum.aṇi-pammu-ūr	-	big necklace maker’s town	பெரும் அணி பம்மூர்
372 = 342+400+397+162	 =	vel-aṇi-nuṟan-ūr	-	town with hunters, pearl and cloth workers	வேல்திரள்நுழனூர்
194 = 342+400+397+162	 =	mu-iru-mēl-per-ul	-	the mighty mel-perul	மூவிரு மேல்பொருள்
96-409		nannilai (nannu-nil-ai)	3588	amiable	நன்னிலை
94-409		nanniral (nannu-niral)	3672, 3673	make orderly	நன்னிரல்
350		veḷḷāḷar	5507	agriculturalist	வெள்ளாளர்

Glyphs grouped under categories

A word of caution must be mentioned here that since these are primarily syllables, their actual use in a text may not correlate to below category.

Description	M77 Signs	Glyphs	Tamil
Activity-based countries	261, 391, 162, 245, 12, 326, 400, 311		கோவன், பல்லவன், வலையன், தட்டான், உழவன், இலையன், நுழம்பன், பானன்
Farming: farmer, farm town	12, 15, 178, 124, 341		உழவன், உழவூர், கலப்பை, ஏர், உழு
Horticulture: leaf, flower	326, 54		செடி, பூ
Hunting: trapping, spear	35, 293, 162		வலையன், வலையன், வேலன்
Cattle farming: herding and selling	30, 301		கோ, கோட்டை, கோவன், இடையன்
Carpentry and metallurgy: metal and wood work	245		தட்டி (தட்டான்)
Tayloring: stitching	400, 219, 182		நுழல், தை, அணி
Honey gathering	180		கொட்டு தேன்
Singing: harp, musician	311, 31		யாழ், பானன்
Trade: barter, buy/sell	51, 130		மாறன், மாற்று, கொள், கொள்ளல், மாற்றல், சேர்ந்துகொள்ளல்
Transportation: ship, boat, raft, manual cart, bullock cart, boat	59, 65, 70, 72, 67, 211		கன்னி, பெருங்கன்னி, கல், கொல், கொண்ட, அம்பி
Movement: goods, send	153, 155		பொருள்/பெருமுதல், அனுப்பு

Fish signs and it’s varied manifestations

If we look at the frequency of the consonants in Tamil (both modern and old), the one that comes on top is “ka” and not “ma” or “mi”. We know that the fish sign is the most frequent in Indus script, so the obvious Turing’s not so enigmatic result is that the fish sign must start with “ka” and we found “kanni” is probably more feasible. However, our result “kanni” is independent of it and was inspired by M.V.Bhaskar’s interpretation (personal communication) that the “Garial” (the river crocodile) is synonymous with fish and was probably trained and used as a boat. My own personal exposure to local customs also revealed that “kanni” is a term used commonly in earlier times for boat or any vehicle. The analogy could be that “kanni” refering to a women carrying children or it could be that the boat itself was driven by women in those days. However, this analogy is not without it’s difficulty. The word “kaṇṇi” refered in modern Tamil to be a maiden is without any support in DED [1]. The only support comes the word “kaṉi” according to DED 1408 is “tender”, “love”, “devotion” etc., and so is “kātal” DED 1445 - “love”, “affection”, “lust” etc. From not so mystical angle it could be just derived from “kaṇ” DED 1159 “eye”, “peacock’s tail”, probably leading to a mystical euphemism. Support from another quarter is “traveling places” come from DED 1443 “kāṇ” – “to see”, DED 1161 “kaṇ” – “place”, DED 1166 “kaṇai” - “arrow”, and DED

1109 “kaṭa” - “to move”. The interpretation that it is “kaṇṇi” is reinforced by other evidences like sign-63 “kaṇṇi-pori”, where it is meant as a “snare” DED 1183+4538.

Assuming that sign-59  is “kaṇṇi”, it could mean any of these things: vehicle, boat, cart, trap, trapper, soft, tender etc. We will show lines of text that seem to provide such evidences, but before that we decide a few variants of fish sign and phrases:

Standalone fish signs

M77 Sign	Glyph	Syllable	DED	Description	Tamil
59		kaṇ, kaṇṇi	1408, 1109, 1183, 1159	boat, bamboo raft, soft, trapping	*கண், கன்னி*
72		kōl	2238	boat, raft	*கோல்*
70		kāl	1483	cart	*கால்*
65		peru-kaṇṇi	-	big boat	*பெருங்கன்னி*
67		kondu, kōnda, gōnde	2053, 2216	bull, with	*கொடு (கொண்டு), கோண்டே, கொண்டே, கொண்ட*

Fish sign phrases

M77 Signs	Glyph	Syllable	DED	Description	Tamil
67-65		peru-kanni-kondu	-	with big vehicle	*பெருங்கன்னி கொண்டு*
70-67		kondā-kāl	-	bullock cart	*கொண்டா கல், கோண்ட கல், மாட்டு வண்டி*
70-67-65		peru.kanni-kondā-kāl	-	big bullock cart	*பெருகன்னி கோண்ட கல், பெரு மாட்டு வண்டி*
72-67		kondā-kōl	-	bullock raft?	*கொண்டா கோல்*
59-328		u(ka)-kanni	559, 563	boat rising in waves	*யுக கன்னி*

Reading lines of text with fish sign

Sample line 1 (kanni = trapper)

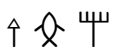


mutal-vilampan-mu.malai-kanni

முதல்-விலம்பன்-மும்மலை-கன்னி

Semantics:
Chief archer, an expert trapper of three mountains

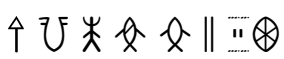
Sample line 2 (kanni = transport vehicle)



nilai-kanni-anupu
நிலை-கன்னி-அனுப்பு

Semantics:
(Please) sends (goods) by a stable boat/raft/cart

Sample line 3 (kanni = boat/raft)



palla-ar-iru-kanni-kōl-velan-ūr-anupu
பல்லர் இரு கன்னி: கோல் (மூலம்) வேலனூர் அனுப்பு

Semantics:
Elephant town turthful kind man: sends (goods) by boat to hunter’s town

Agriculture and it’s related signs

M77 Sign	Glyph	Syllable	DED	Description	Tamil
12		uṛavan	688	farmer	*உழவன்*
13		uṛavāḷ	688	farm worker	*உழவாள்*
14		per-uṛavan	688	big farmer	*பேர் உழவன்*
15		uṛavūr	688	working, farming town	*உழவூர்*
112		ñālam, nallam	2913, 3613	land, fertile black-soil	*நாலம், நல்லம்*
169		nilam	3676	land, ricefield	*நிலம்*
169-112		ñālam-nilam	2913-3676	fertile land, ricefield	*நாலம் நிலம், நல்லம் நிலம்*
113		viḷai-ñālam	5437, 2913	cultivated land	*விளை நாலம்*
389		pañ-nilam	3837	ploughed land	*பண்னிலம்*
178		kalappai	1304	plough	*கலப்பை*
124		ēr	2815	plough	*கலப்பை*
341		uṛu	689	harrow	*உழு (பரப்பு, பரம்பு)*
176		vanji	5265, 56, 55	paddy, rice	*வஞ்சி*
412		nāṅkuṛu	2906	earthworm	*நாண்குழு*

Franklin Southworth [6] work on connection between rice cultivation and Dravidian language shows how vanjī is related to rice:

“vari-(n)ci (with variants *vari, *varici, *varinci) ‘rice, paddy’ DED 5265 can be reconstructed for Proto-Peninsular Dravidian ... It is the source of the word for ‘paddy’—i.e., rice in the field or after harvesting and threshing, either husked or unhusked, but not yet cooked—in most of the modern

Peninsular Dravidian languages. This word may be connected to the Elamite bar ‘seed’—though there is some doubt, as the phonetic correspondences are not regular. A related form, *ari-ci/ki, with variants ari, arici, akki, arki (the last two ← *ariki) DED 215”

The Indus barter exchange system

We only illustrate the key points here. The local barter happens in the undocumented unorganized sector at the cross-roads (𓉔), in what is termed as “cantai” (*சந்தை*) in modern Tamil. The exchange is abstracted by the symbol 𓉔 and the barter mediated by 𓀬 (maran?), who is usually qualified by great reliable ancestary (flowery self-praise by the system). The exchange is done by symbol 𓆑 (kol, the dagger of exchange) and 𓉔 (an abstraction of the cross-road, 𓉔). Most of the script pertains to official barter transactions of Indus, which are really instructions of transporation mode and the origin/destination. The clitics like 𓄑 (M77-99) orchestrate the sentence structure of the lines of the seals. An highly compressed form of information exchange mechanism is enabled by the drsastic use of poly-semantic logo-syllabic script with each of these logo-syllables having many semantic possibilities with high degree of pun. This is so deeply wedded to Indus culture and mode of exchange that the deciphering of it has taken so long. The skills of bronze-age artisans is in full display here with those hundreds of poly-semantic logo-syllables crafted and designed with care to work in those small spaces available in the seals. What is interesting that the deeply mysterious swastic symbol (M77-148) is now understood as the mundane:

𓍿 = 𓉔+ 𓆑 = cērukoḷ = *சேர்ந்துகொள்*

i.e., declaration of an important exchange, which is usually followed by drum beats 𓆈. The drum beats are also a way to invite more people to the square for exchange (at cross-roads).

Relative volume of trade

We consider the absolute occurance numbers in the text and also the association to the right of sign no. 99 𓄑. If we assume that what procedes (to the right of) sign. 99 𓄑 is the sender of goods then we get the following data:

Glyph	Description	No. occurances	Forward transactions
𓃾	Cattle	369	290
𓃰	Ivory	182	82
𓃱	Hunting and trapping	130	61
𓃲	Agriculture	225	18
𓃳	Honey	44	18
𓃴	Elephant herding?	15	10
𓃵	Cross-road	41	8
𓃶	Tailoring	14	4
𓃷	Jewellery	12	3

Glyph	Description	No. occurances	Forward transactions

Among 634 occurances in IVC text with sign no. 99, assuming that what comes to it's right is the region that is sending commodities to the other regions, we can summarize that cattle and agriculture were the dominant activities, closely followed by carpentry and elephant-based products. Hunting, honey-gathering, fishing, carpentry, weaving and stitching were the other important activities that created products participating in the organized barter system of IVC. Hunting, honey-gathering, fishing, carpentry, metallurgy, weaving and stitching were the other important activities that created products participating in the organized barter system of IVC.

Class structure of IVC

It seems from the table above that the cattle herders had the dominant trade surplus and probably the agriculturists had the highest trade deficit. Sign-41 kīṛān (DED 1621) *கீழான்* refers to a poor person and studying his concordance we see that he is strongly associated with sign-137 cēri (DED 207) *சேரி*, a place where many people assemble, associated in modern terms with the hut dwelvements or slums in cities. It is quite surprising that this association has remained true for 5000 years! It is also noted that sign-41 (kīṛān) has atleast one association with all professions, except cattle herding (sign-267). So it is clear that there is a class structure associated with IVC which puts cattle-herders () at the top.

Praise heaped on the farmer

The barter system's accumualtion of wealth by the ruling elite (sign-30 "kovan"), accumulated in store-houses (sign-267 "koṭṭa") necessiates a rhetoric of praise on the toiling farmer (sign-12 "vuṛavan") like:

M77 signs	Glyphs	Syllable	Tamil	Description
12-75		peru.mu.kanni-vuṛavan	*பெரும்முக்கன்னி உழவன்*	Enormously mature and soft farmer
12-2-86		mutal-kāvalan-vuṛavan	*முதன்மை காவலன் உழவன்*	First guardian farmer
12-325-86		mutal-ilai-vuṛavan	*முன்னிலை உழவன்*	The foremost farmer

Such eulogy of farmer and farming has continued even 2000 years after IVC culture in Thirukkural:
Kural 1031: Howe'er they roam, the world must follow still the plougher's team;
Kural 1032: The ploughers are the linch-pin of the world; they bear.

Frequency of adjectives of towns

Adjectives of towns	Syllable	Frequency	𒆪* Frequency	𒁲* Frequency	Description	Tamil
	nilam	225	47	18	land	நிலம்
	vel	196	40	8	lance	வேல்
	nal-aran	168	114	0	dood morals	நல் அறன்
	valaiyan	130	14	54	trapper	வலையன்
	vel	117	112	0	hunter’s town	வேலூர்
	velan	104	93	0	hunter	வேலன்
	arai	87	34	0	godown	அறை
	nal-vari	87	44	1	cross-road	நால்வழி
	valai	80	37	7	net	வலை
	vari	35	32	0	road	வழி
	ce	32	32	0	bronze town	செம்பூர்
	peru-vari	35	23	0	big road	பெருவழியூர்
	puli	25	21	0	tiger country	புலி
	tatti	134	70	6	smithy/carpenter	தட்டி
	er	78	16	0	plough	ஏர்
	iru-valai	51	28	0	strong net	இருவலை
	tai	129	40	9	tailor	தை
	ilai	32	18	0	horticulturist	இலை
	vaalai-kanni	13	12	0	fishing	கன்னி வலை
	nalnellal	61	14	8	good farmer	நல்நெல்லாள்
	vilai-nallam	17	15	0	fertile rich land	விளை நல்லம்
	mel	56	14	2	uptown	மேல்
	mu.iru.mel.per.ul	56	27	1	mighty uptown	மூவிருமேல் பொருள்

Other adjectives (praise) and their frequencies

Adjective	Syllable	Frequency	Description	Tamil
	nal-aran	168	good moral	நல் அறண்
	mu.iru.mel.per.ul	56	mature-truthful-all-mighty	மூவிருமேல்பொருள்
	mutal	143	chief, foremost,	முதலாம், முதலவன்
	mū	300	mature	மூ-

Adjective	Syllable	Frequency	Description	Tamil
	alaku	47	beauty, unperturbed	அழகு, அலங்கா
	nilai	130	firm, stable	நிலை
	iru-nilai	38	very firm, stable	இருநிலை

Postpositions and their fequencies

This is the equivalent of prepositions in English, but in Tamil they are post-positions and not pre-positions.

M77 sign	Glyph	Frequency	Syllable	Description	Tamil
336		229	utan	with, together, agreement	உடன்
99/100		663	-ar	it's	-ஆர்
123		189	-ar	it's	-ஆர்
97/98		174	-il	-in	-இன்

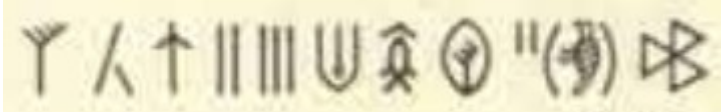
Broad observations

One of the surprising observation in this decipherment is that almost no individual identities like personal names are found in the text. All trade transactions are from one collective identity like country, village/town to another country, village/town. Individuals are extolled within the colective identity of farmers, workers, etc. There are however, strong leadership role identitites like chief "mutalvan", "peru(m)-kanni", "mu-velan", "iru-velan" etc. It seems that there are store houses were the items are sent and dispersed through some social mechanism of distribution. It seems that the distribution process could be related to sign-37  "viḷampu" (DED 5434) and sign-28,  "viḷampan" seems more like the supervisor of distribution of goods. Sign-17 (villavaṉ, villōṉ) seems like another protection officer cader maintaining law and order. Probably the sign-176  "anjih" is a place each of the specialized workers like tailors, jewellery makers, carpenters, bronze workers, ivory workers, with each having a separate specialization location in town where others can reach them as targets for exchange. This tradition continues in many town in India even now, although in rapid decline with the arrival of multispeciality supermarkets.

Semantic reading

The whole exercise of decipherment will be meaningless gibberish if it doesn't lead to any to proper semantic outcomes. We have already seen a range of professions, towns and trade symbols that we are able derive from the excercise. We will now read a few lines using the above syllabary that we have declared.

1. M77 Line 1006-100101



NFM font equivalent rendering:

390

Very clever trapper velappan of the triple mountain: sends by boat along the big river with care to the tiller of land
பறவைகளை வேட்டையாடி விற்க்கும் மும்மலையார் வேலப்பன்: பெருங்கண்ணி உடன் முன்னிருந்து அம்பி (படகு) ஏர் உழும் நில(த்துக்கு)

The break-up steps:

: valai-puri (*வலை-புரி*) mu-malai-ar (*மும்மலை-யார்*)

: velappa (*வேலப்ப*)

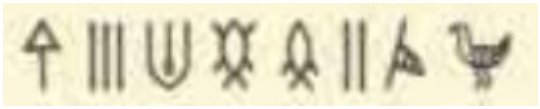
: peru-kaṇ-uṭan (*பெருங்கண் உடன்*)

: mu-iru (*மூ-இரு*)

: ambi (*அம்பி*)

: ēr-nilam (*ஏர் நிலம்*)

2. M77 Line 1008-100101



NFM font equivalent rendering:

Bronze countryman: sends by bullock-cart to triple mountain
சேவல் நாட்டார்: மாட்டு வண்டி உடன் மும்மலை(க்கு) அனுப்பு(கிறார்)

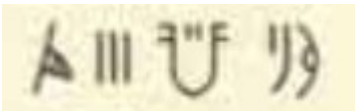
The break-up steps:

: cēval-naṭṭ-ar (*சேவல் நாட்டார்*)

: kanni-konṭa-uṭan (*கன்னி கொண்ட உடன்*)

: mu-anupu (*மூ-அனுப்பு*)

3. M77 Line 1029-100101

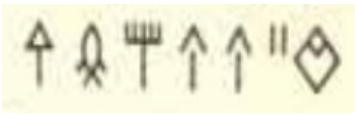


NFM font equivalent rendering:

Hunter/trapper townsman’s three-mountain country
வேட்டையாடி வலை பிடிக்கும் ஊர் மும்மலை நாடு

The break-up steps:
: valai-an-in (*வலையனின்*)
: ur-ār (*ஊரார்*)
: mu-nāṭu (*மூநாடு*)

4. M77 Line 1032-100101

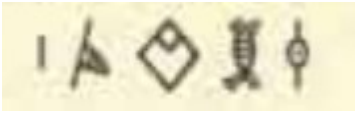


NFM font equivalent rendering:

Cattle country: prized goods sent by stable boat
கோட்டூரார்: பெருமுதல் பொருள் நிலை கன்னியில் அனுப்பு(கிறார்)

The break-up steps:
: koṭ-ūr (*கோட்டூரார்*)
: peṟu.mutal-poruḷ (*பெருமுதல் பொருள்*)
: nilai-kanni-anuppu (*நிலை கன்னி அனுப்பு*)

5. M77 Line 1067-100101

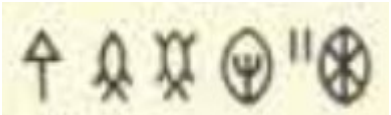


NFM font equivalent rendering:

The pearl necklaces are being bartered in cattle country
அணியல் மாற்றம் கொட நாட்டில்

The break-up steps:
: aṇiyal (*அணியல்*)
: marṟam (*மாற்றம்*)
: koda-nāṭu-il (*கொடநாட்டில்*)

6. M77 Line 1088-100101



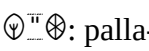
NFM font equivalent rendering:

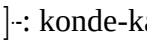


Elephant country velappan: sends by bullock cart

பல்லார் வேலப்பன்: மாட்டு வண்டியில் அனுப்பு(கிறார்)

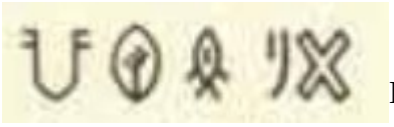
The break-up steps:

: palla-ar-velappa (*பல்லார் வேலப்பன்*)

: konde-kanni (*கொண்டே கன்னி*)

: anuppu (*அனுப்பு*)

7. M77 Line 1095-100101

 NFM font equivalent rendering:

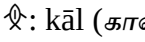


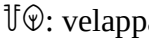
Cross-roads countryman sends cart to velappa town

நால்வழியார் வண்டி வேலப்ப ஊர்(க்கு)

The break-up steps:

: nal-vaṟi (*நால்வழியில்*)

: kāl (*கால்*)

: velappa-ur (*வேலப்ப ஊர்*)

Pluripotency

The fish sign-59  `kanni` takes the values of boat, craft, vehicle, bullock cart in these cases. We have also observed that in some other case:



that the sign-59 `kanni` takes the value of “trapper” or “trapping”.

From these readings we also obtained:

`ampu ≈ anuppu ≈ ambi`
`kondā ≈ konda`

The syllables not only took different semantic values from the standalone values but they also took a deformed phonemic values, a key aspect of Indus writing system that enables pluripotency in both form and content in order increase coverage with only a few signs, thus increasing literacy.

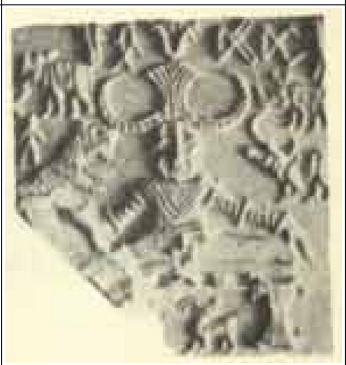
Further readings

The above section considered just seven sentences in IVC text, but there are several thousand lines of text in M77 [2] and we will be pursuing decipering them over time. Few pages have already been deciphered from the lines of text available in Mahadevan's work [2]. The results will be reported in online version tracking system, as and when we decipher them [7].

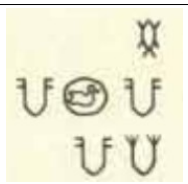
Graphics and text: a show and tell

In this document we decipher the text embedded along with illustrated scene in some of the IVC tablets. We have selected only the ones that have certain dramatic element in it.

M77	Graphics	Glyphs	Syllables	Description	Tamil
Plate V - 98			tallu-utai	push-kick	தள்ளு உதை
Plate V - 103			ceru-kottu-tadu-iru	stop-fight	செருக்கொட்டு தடு-இரு
Plate V - 105			iru-vilagu-ar-kanni-anuppu	prevent fighting by sending guard	இரு-விலக்கார்-கன்னி-அனுப்பு

M77	Graphics	Glyphs	Syllables	Description	Tamil
Plate VI - 114			mu-tāṟi-tai-koḷ-ūr-an	accept ancestoral power transfer	மூதாழிதை கொள் ஊரான்
Plate IV - 80			nal.vaṟi-yar-velan-kal-aru-ūr	Controller of cross-way Velan sending boat along the river in the town	நால்வழியார் வேலன் கல் ஆற்றூர்
Plate IV - 81			tan-taṟi-mu.ūr-kanni-ūr	Controller of many country transactions	தன்தாழி வேலப்ப மூவூர் கன்னியூர்
Plate III - 55			palla.kotta-ar-velan-kanni-anuppu-māṭi	Unity of seven (3+2+2) nation’s Velan (controlling bureaucrat?): Elephant fort sending by vehicle to buffalo country	பல்லர் கோட்ட வேலன் கன்னி அனுப்பு மாடி/மாடு

M77	Graphics	Glyphs	Syllables	Description	Tamil
Plate III - 54			anjih.an- ūr-ar-mel-konda-ūr-an	Five-cross-way multi-storeyed rest-house for travellors	அஞ்சியன் ஊரார் மேல் கொண்ட ஊரான்
Plate III - 57			mu-puli(malai)-velan-eṟuvanji	Three-mountain tiger country excellent rest-house for hunters	முப்புலி வேலன் எழுவஞ்சி
Plate III - 50			muvan-eṟuvanji-yar-ēr-ūr	Rhino country seal: Three-mountain rest-house to tiller’s land	வலன் மூவன் வஞ்சியார்: ஏர் ஊர்
Plate III - 51			palla-ar-māṭṭu-vel-ūr	Markhor country seal: Elephant country loads to hunter’s town	பல்லர் மாட்டு வேலூர்

M77	Graphics	Glyphs	Syllables	Description	Tamil
Plate I - 18		𐃉𐃊𐃍𐃏𐃆𐃇	koṭa-ar-konda-para-iru-ūr	Elephant country (food): Cattle herder sending by bullock to messenger's town	கோட்டார்: கொண்ட பறையர் ஊர்
Line 1093		𐃍 𐃉𐃊𐃉 𐃉𐃉	konda ūr-ta̲rupu-ūr velūr-ūr	Gathering of buffalo townsmen at Velūr town	கொண்ட ஊர் தறுப்பூர் வேலூர் ஊர்

Major countries depicted by animals in seals

This is another major category that is directly indicated by animals.

Plate III -55 [2]





Here we can see five major countries indicated branching from two unicorn motifs and here with two of them further branching into two subcategories.

The seal on the right is either calling for (or celebrating) bartering between five countries:

𐃉𐃈𐃌 (para-ar-ūr, *பறையூர்*)

calling for five nations to join in the barter system

𐃎𐃎𐃎𐃎𐃎

(cerukol, *சேர்ந்துகொள்*)

The animals that seem to indicate the five nations [4] in the seals are:

Markhor/Gaur (bison) 𐃆, Buffalo 𐃋, Elephant 𐃐, Rhino ? and Tiger 𐃑.

Although all the skills and specialised skill centers (vanjih, 𓎛) are all distributed all over the towns and villages of all countries, in triple mountain tiger country (Afghanistan?) there seems to be preponderance of hunters, animal trappers and honey collectors.

A brief summary of the of the IVC writing system

The IVC system can be considered as a resolution of the contradiction arising between pure ideographic and pure syllabic system of writing. We were able to associate unique syllabic value to every sign. Although the ideographic system allows easy understanding of the base signs through a Dravidian root-word association, they also create a complex plethora of signs for the IVC writer to recognize and use. In order to reduce the number of signs needed, a pure syllable-based number system seems to have been used, which is affixed/prefixed/welded to the base sign to produce aglutination of word-pieces. The core consonant backbone of the base is maintained in the aglutination process, but the affixes may retain only the front/middle/tail syllable, depending on whether it is affixed/infixed/prefixed, respectively. Although each sign signifes a syllable and not a concept or idea, an ideographic undercurrect remains strong throughout the IVC writing system, creating certain stability of the semantics of the writing system. It is also observed that certain amount of arbitrariness is allowed during the aglutination process: deletion, modification or addition of vowels/glides. Glides are soft consonants that are added as binders for smooth phonetic transition between hard consonants. For proper understanding of practical Tamil grammar as it is spoken now one can consult Harold F. Schiffman [8], but one must not apply these grammar rules blindly to the IVC writing system, as 5000 years separate the present Dravidian languages and the IVC languages.

Overlap with previous work

No work germinates on it's own; it usually germinates on a fertile ground laid down by others. There were many conjectures on this Indus writing system by Asko Parbola, Iravadham Mahadevan and Brian Wells. I will briefly outline some of them pointing out overlaps and differences. It all started with the interpretation for fish sign as "mīn" by father Heras in 1930s [9]. This was reiterated with caution by Iravadham Mahadevan [10]. If we look at the frequency of the consonants in Tamil (both modern and old), the one that comes on top is "ka" and not "ma" or "mi". We know that the fish sign is the most frequent in Indus script, so the obvious Turing's not so enigmatic result is that the fish sign must start with "ka" and we found "kanni" is probably more feasible. However, our result is independent of it and was inspired by M.V.Bhaskar's interpretation (personal communication) that the "Garial" (the river crocodile) is synonymous with fish and was probably trained and used as a boat. My own personal exposure to local customs also revealed that "kanni" is a term used commonly in earlier times for boat or any vehicle. This was probably dropped later on in Tamil literature. The same however continues in Indo-European tradition that associates feminine gender to even a modern vehicle like train inflecting verb appropriately.

There were many interpretations by Asko Parbola and Mahadevan [11] on the M77 sign-342 𓋴, including "-an". MVB was quite critical of this being male-centric, an apt criticism, as he found no preponderance of male domination in IVC art. The interpretation of sign-1 𓀠 as "-an" has also been proposed by Bryan Wells [3] and then MVB's criticism can be cleverly overcome by stating that "-an/-al" could have been sex-neutral term in those days and associating "-al" with feminine gender could have been a later invention by the male-dominant society (especially as "-al" has connotation

with darkness and evil). On other proposals of Iravadham Mahadevan and Bryan Wells's on numbers as being semantically numbers, we found no parallels in our interpretations. In fact, the numbers are probably the only signs that almost never reflected their standalone ideographic value. This was indeed quite suprising for us, as we found almost no evidence for this. MVB has been quite radical in this interpretation, proposing that almost a new syllabic system can be conjured-up using just the numbers alone.

Yuri Knorozov [12] has also done extensive study of the IVC writing system and he has correctly identified numbers as syllables, with sign-86 identified as "or", as "iru", as "mu", as "nal", as "ai". This is exactly as what we have deciphered here, although we consider sign-86 as "mutal" and not "or".

Bryan Wells's work also proposes other possibilities like sign-358 being closely related to the Hare's ears and so proposing the syllable "ce" from "cevian". The author is in full agreement with this proposal and in fact, both this and sign-76 also evokes the same "ce" syllables. In the IVC context of bronze-age, these have semantic connotations to "cembu" (bronze). Bryan Wells also proposed "kō" for sign-261 ♢ and "kōṭa" for sign-267 ♢. We are fully in agreement with these readings.

Ansumali Mukhopadhyay [13] studied the word for teeth, "palla" and it's relationship to the ivory trade. The sign-391 is here deciphered as "palla", the elephant, an important sign in the IVC, especially in relationship to the ivory trade. There could have been many more proposals that may have some overlap with our interpretations here. We would be glad to include them in our document as soon as we are made aware of them.

Farmer et al. [14] criticism that the average number of signs in a line are two short (on the average of between 4 and 5 signs) for any meaningful orchestration of a writing system is quite correct. However, our decipherment points out that these lines of text are mostly **from/to** addresses with mode of transport indicated through fish and arrow signs in-between the **from** and **to** addresses. Sometimes the mode of transport is left out (or is implied) and the same could be true of the **to** address, which probably is implied from the context. There are also very short lines heaping praise on towns and their workers. In any case, writing in crisp and short messages is a tradition that has continued for a long-time in Dravidian tradition, as established in Thirukkural, which is taught even now in schools of Tamilnadu.

Conclusions

First important study of the Dravidian family of languages was by Caldwell [15] in 1886. Recent studies indicate that the temporal origin of proto-Dravidian to be around 2500 BCE [16, 17], so it can be discerned that the Indus script could have been a major epicenter for the formation of the identity of Dravidian language family. We can even go ahead and conjecture that some aspects of Dravidian linguistic structure could have been a result of remoulding of languages of the Indus Valley Civilization into an aglutinative reformulation as contrained and evolved by the Indus script. After the gradual decay of IVC, with southern migration of the population, the language could have radiated into the many branches of Dravidian family [16]. A detailed study of the decipherment and it's relationship to Dravidian morphology could provide further clarity on this feasibility.

Acknowledgements

The decipherment became possible with the arrival of the splendid work by MVB [4]. This laid down the map that lead to all the linkage between graphics and the text, building this beautiful journey of discovery enabled by M.V. Bhaskar, with whom I have been working for the past several years. My learning in art, Brahmi and Indus Script derived from his interactions. Of course, all this work could not have been possible without the enormous efforts of Asko Parbola, Irvadham Mahadevan, Bryan Wells and many others. Thanks are also due to Eugenia Vanina for enlightening me about works by Russian scholars on Dravdian languages and the Indus script, especially the collected works of Yuri Knorozov [12].

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